

## Beacon Power 20 MW Flywheel Frequency Regulation Plant

### Project Description

Beacon Power will design, build, and operate a flywheel energy storage frequency regulation plant at the Humboldt Industrial Park in Hazle Township, Pennsylvania. The plant will provide frequency regulation services to grid operator PJM Interconnection. Beacon's technology uses flywheels to recycle energy from the grid in response to changes in demand and grid frequency. When generated power exceeds load, the flywheels store the excess energy. When load increases, the flywheels return the energy to the grid. The flywheel system can respond nearly instantaneously to an independent system operator's control signal at a rate 100 times faster than traditional generation resources. The system does not burn fuel and has zero emissions. The Beacon Gen4 flywheel is designed with 100 kW of output and 25 kWh of energy. Two hundred flywheels will be connected in parallel to provide 20 MW in capacity and can fully respond in less than 4 seconds. The plant can operate at 100% Depth of Discharge with no energy degradation over time and can do so for over 150,000 full charge/discharge cycles. The flywheels are built to last 20 years or more. Virtually no maintenance is required in the mechanical portion of the flywheel system. Flywheel technology has been successfully tested on live grids at scale power in New York and California. The technology achieved system availability of over 97 percent, higher than the average for conventional generators performing frequency regulation. It has been deployed at multi-megawatt scale under New England's Alternative Technologies pilot program. The site has the potential to support the distribution system that connects a nearby solar project to the grid.

### Goals/Objectives

- Demonstrate and speed the deployment of fast response flywheel-based frequency regulation
- Stimulate the international market demand for flywheel energy storage
- Quantify and verify the commercial viability and scalability of this Smart Grid energy storage technology
- Increase transmission capacity and reduce congestion

### Key Milestones

- Flywheel manufacturing complete (April 2013)
- Plant construction complete (July 2013)
- Plant commissioned (November 2013)

### Benefits

- Job creation
- Grid reliability improved
- Wind and solar power use increased
- Greenhouse gas emissions reduced
- Dependence on fossil fuel decreased



### CONTACTS

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### PARTNERS

PJM Interconnection  
Midwest Generation

### PROJECT DURATION

1/1/2010–12/31/2014

### BUDGET

**Total Project Value**  
\$53,069,552

**DOE/Non-DOE Share**  
\$24,063,978/\$29,005,574

### EQUIPMENT

Beacon Power flywheel energy storage units (200)  
Electronics Conversion Modules  
Flywheel Control Modules  
Cooling system  
Power transformers  
Switch gear

### DEMONSTRATION STATES

Pennsylvania

CID: OE0000200

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